

Electric Oil Pump for Cooling and Lubrication

PMC Technologies Inc



Electric Oil Pump Development

300W ~350 W electric oil pump

>26Lpm @2bar

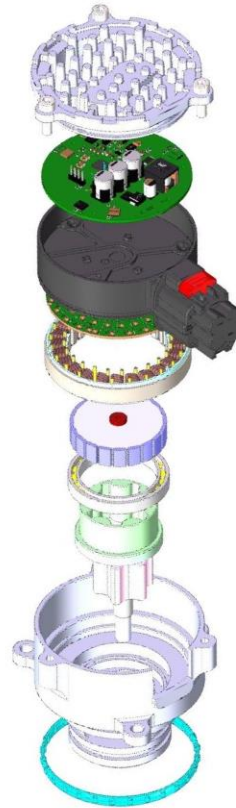
75mm Motor

Resolver based FOC



{ A high precision temperature-controlled electric oil pump }

Patent Application No.:202311034365.1



80W ~200W electric oil pump

>15Lpm @2bar

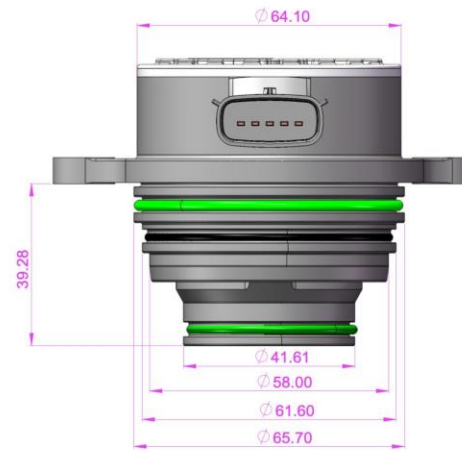
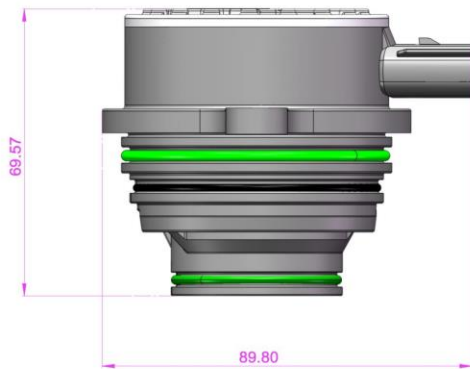
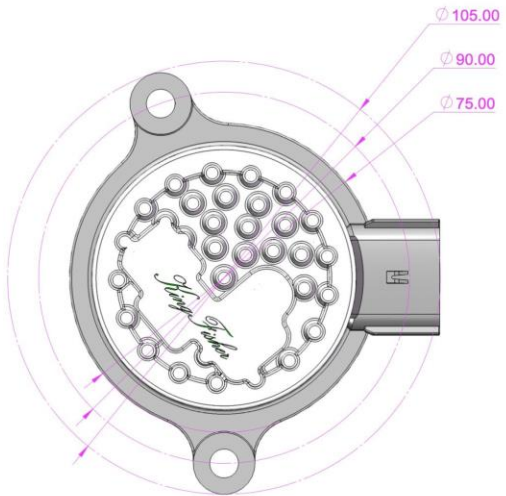
58mm Motor

Resolver based FOC



{ A highly integrated electric oil pump }

Patent Application No.:202311608228.4



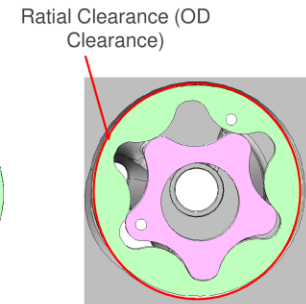
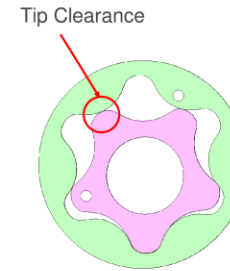
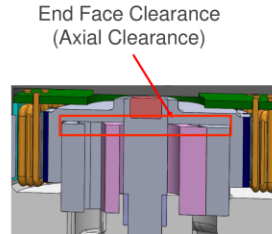
Weight: 590+/-10g



Gerotor Pump Design/Simulation

Gerotor pump 5/6. Displacement: 5 cc/rev

Pump Clearances	μm
Tip	170
Radial	90
End Face of Inner rotor	43
End Face of out rotor	52

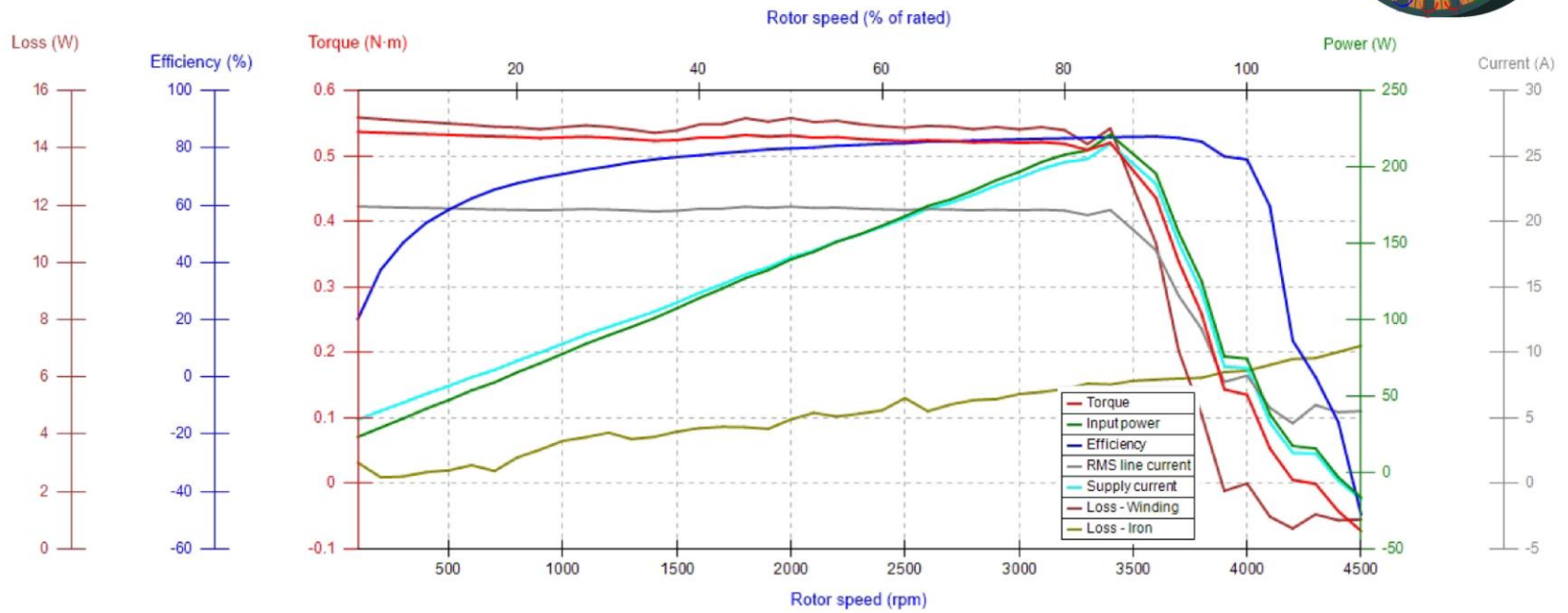
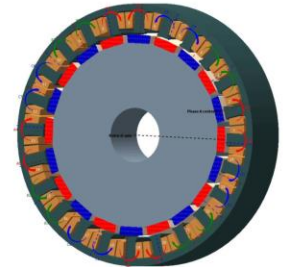


Pump requirement at the working points

Temperature	Pressure	Flow rate	Torque
°C	bar	lpm	N*m
0	2.0	5.00	0.55
20	2.0	10.00	0.45
30	2.0	11.67	0.44
45	2.0	13.33	0.41
60	2.0	16.67	0.40
80	2.0	16.67	0.37
90	2.0	16.67	0.36
110	2.0	16.67	0.35
125	2.0	16.67	0.34

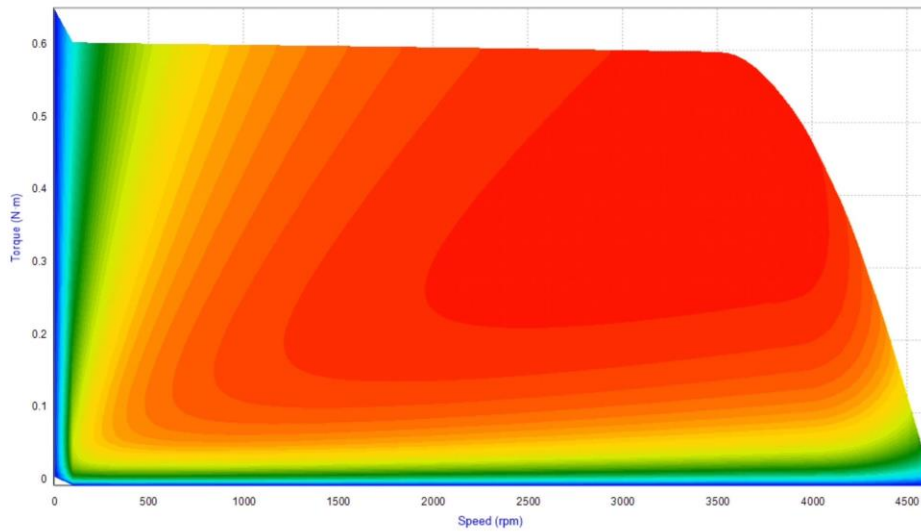
Motor Design

- ❖ 24 slots with 20 poles Coil winding
- ❖ 58 mm diameter
- ❖ 13 mm stack length of SMC stator
- ❖ N42UH magnet

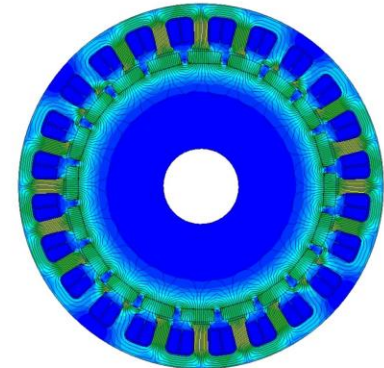
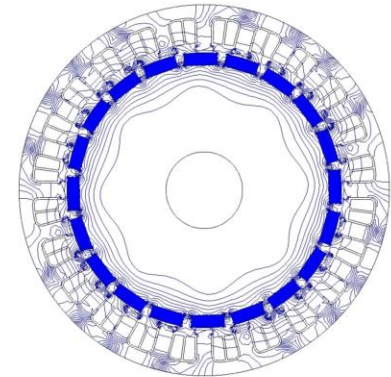


Motor Simulation

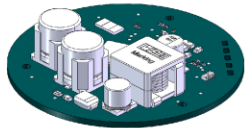
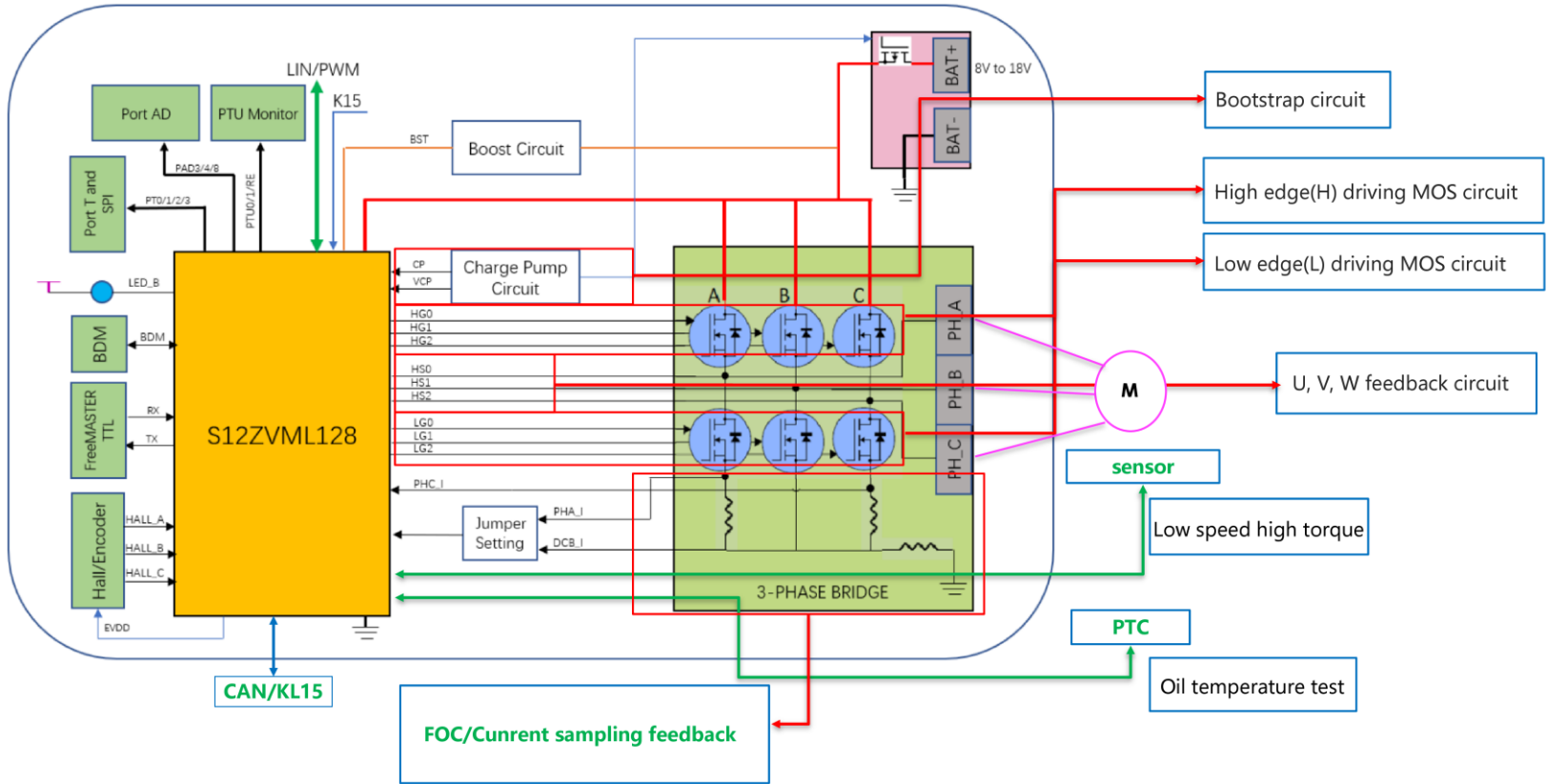
Efficiency Map
58 mm motor arc



Efficiency	
83.2 - 85	29.6 - 31.3
81.4 - 83.2	27.7 - 29.6
79.6 - 81.4	25.9 - 27.7
77.8 - 79.6	24.1 - 25.9
76 - 77.8	22.3 - 24.1
74.3 - 76	20.6 - 22.3
72.6 - 74.3	18.7 - 20.6
70.7 - 72.6	16.9 - 18.7
68.9 - 70.7	15.1 - 16.9
67.1 - 68.9	13.3 - 15.1
65.3 - 67.1	11.5 - 13.3
63.5 - 65.3	9.76 - 11.5
61.7 - 63.5	7.97 - 9.76
59.9 - 61.7	6.17 - 7.97
58.1 - 59.9	4.38 - 6.17
56.3 - 58.1	2.59 - 4.38
54.6 - 56.3	0.8 - 2.59
52.8 - 54.6	
51 - 52.8	
49.2 - 51	
47.4 - 49.2	
45.6 - 47.4	
43.8 - 45.6	
42 - 43.8	
40.2 - 42	
38.4 - 40.2	
36.6 - 38.4	
34.8 - 36.6	
33 - 34.8	
31.3 - 33	



Controller Principle



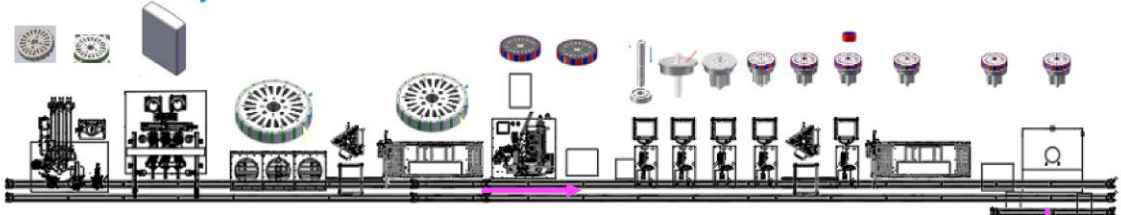
Core technology:

Resolver based FOC control-----low speed high torque at Cold start

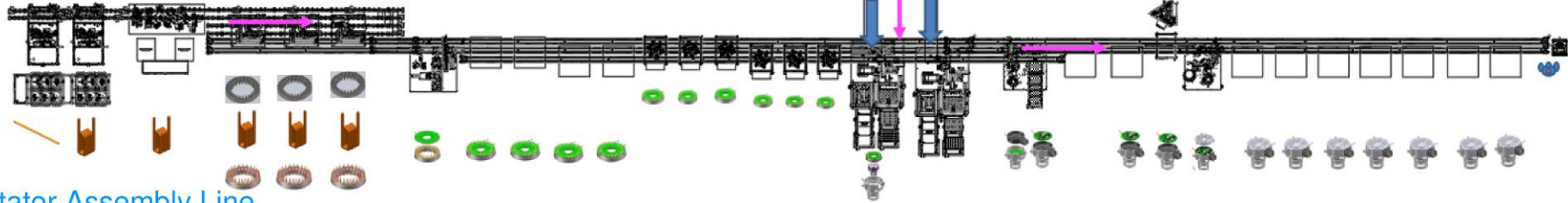
High precision temperature measurement---Support high accuracy of Volume control



Rotor Assembly Line



General Assembly Line

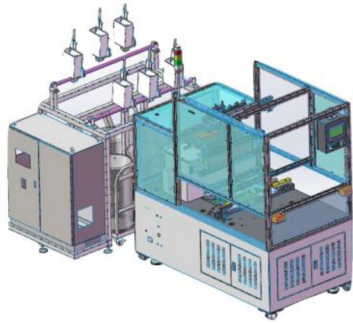


Stator Assembly Line



- Equipment line CT: 14s/pc; OEE: 85%
- Daily capacity: 4300pcs/day
- Equipment Layout [L*W] : 45*8m
- Designed with universal application and machine quick switch.





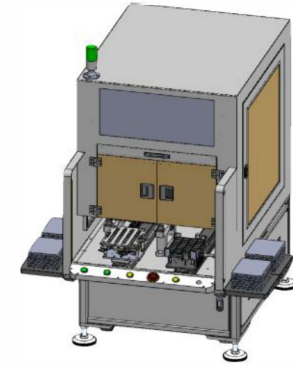
Multi-station Winding Machine



Electrical Dynamometer



High and Low Constant Temperature Test Chamber



Magnetic Performance Test Equipment



Reflow Welding



Auto-assembly Line





Thank
You